

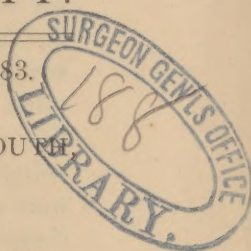
Stephenson (F. B.)

THE PROCEEDINGS OF THE NAVAL MEDICAL SOCIETY.

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YELLOW FEVER AT NORFOLK AND PORTSMOUTH, VIRGINIA, IN 1855.

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In my official connection with the United States Navy Yard at this station I have been led to look up the history of the diseases which have at times prevailed here and in the neighborhood; and although the records are very meagre I have gathered many facts and circumstances relating to the epidemics of yellow fever, especially that of 1855. Some of the results of my inquiries may be perhaps of interest to the members of this Association,¹ and possibly become of service in case of another incursion of the disease.

In these epidemics, as usual in such cases, there were differences of opinion among the physicians of the neighborhood in regard to the contagiousness of yellow fever,² and as to its local or imported origin. Nevertheless, whichever seems the more probable, the location and the condition of the infected district should be borne ever in mind.

Norfolk is situated in latitude 36° 50' N., on the north bank of Elizabeth river. Portsmouth³ lies on the opposite side of the stream, about a half mile distant. Gosport, in which is the United States Navy Yard, is contiguous with Portsmouth. The same description, as to climatic and hy-

¹ This paper was read before the Norfolk (Virginia) Medical Association at its regular meeting in March, 1883, and a few facts, brought out in the discussion which followed, have been incorporated (by permission) with the original matter.

² *Vide* Charleston (S. C.) Medical Journal, May, 1856, remarks by Dr. A. B. Wiliman, to the effect that he had "seen reason to believe in a contagious property exhibited by the epidemic of yellow ~~fever~~ ^{fever} which prevailed here (Norfolk, Va.) in 1855."

³ *Vide*, an interesting and instructive "History of United States Navy Yard near Norfolk, Va.," by Commander (now Captain) E. P. Lull, U. S. N. Washington, 1874.

gienic circumstances, may serve for all. The water of the river is salt. There are several small creeks which cross the cities in various directions; and many coves are formed by the river. The tide flows into these creeks and coves, covering their beds at high water, but leaving their surfaces quite bare at low water. The surface of the land in the town, as well as of the adjacent country, is flat and low, being only a few feet above the level of the river. The original soil is alluvial, consisting of a stratum of clay from three to six feet in depth; beneath this is a bed of fine sand some twenty feet in thickness, which rests upon a layer of marl. The highest mean temperature for thirty years previous to 1856 was 78.28° F. The prevailing winds, during summer, are from southeast, south, and southwest. The climate of this region is generally mild, but in summer is often hot and sultry; it is subject, however, to chilly fogs, and northeast winds with cold rain.

At the time of the epidemic, as now, there was much new-made land. There were, frequently, large quantities of decaying vegetable matters and other refuse in neglected and exposed places at different dates mentioned in this paper.

The population of Norfolk in 1855 was about sixteen thousand; that of Portsmouth about ten thousand. One-fourth of the inhabitants in each case were colored people, including all having negro blood though of light hue. The country around was far more sickly than the town, various forms of malarial fever being prevalent. Within the city the most thickly-settled parts were the most healthy, as is the case at the present time. The annual mortality of the locality was 2.25 per cent. The death-rate for several years previous to 1882 had been, on an average, 2.50 per cent. For 1882 it was 2.90 per cent.

The first epidemic of yellow fever in Norfolk, of which there is any account, was in 1795. From that time the disease prevailed more or less each year, until 1800, when a more decided outbreak took place. The temperature in April, 1800, was 90° F. The summer heat set in early and

continued high. The sultry south winds were more frequent than usual. Persons unacclimated were mostly attacked. Native residents, though not wholly exempt, suffered comparatively little. Of the negroes, many sickened; some died, although this race was less susceptible to the fever than the white people.

In the opinion of the physicians of Charleston, South Carolina, this epidemic was of local origin. The decision of the medical men of Baltimore, Maryland, was also in favor of the origin having been due to local conditions, and that the disease arose from filth and hot weather. Dr. Rush, of Philadelphia, on October 8, 1802, wrote, concerning the contagiousness of the fever: "The yellow fever is not derived from specific contagion; it is always generated by putrefaction; it is not contagious in its simple state, and *never was*; is not; and, while the laws of nature retain their present order, *never can be imported*, so as to become an epidemic in any country."

In 1803 the fever was very severe. During 1804 there was but one case in Norfolk, but it reappeared the following year in malignant form. February, 1804, a great fire occurred in Norfolk, but the return of the malady the next year showed that the fire had no influence in destroying the cause of the fever, as had been supposed by some.

In 1819 an epidemic prevailed along the seaboard, and reached as far north as Boston, where a few cases occurred in September and October. The cases which appeared in Norfolk, in 1821, were traced to a vessel from Guadaloupe. This vessel had several sick men on board when she came into the harbor, and the dead were buried by the crew, under cover of night. It seemed plausible in this instance that the effluvia from the bilge water (whether brought from infected ports or generated on board ship) became the immediate cause of disease in every instance, subsequent to the arrival of the ship, that has been recorded; for every individual exposed to its influence, and almost every one who had come where it was, felt the symptoms of the peculiar

fever. The facts in the case⁴ seem to prove that this outbreak of yellow fever was probably due to something more than mere foulness of bilge water, and point to the existence of something, specific in nature, imported from a place where there had been disease of this kind.

The epidemics of 1822 and 1824 were considered to have been of local origin, as in 1800. In 1826 the disease made its appearance about the 1st of September in the same neighborhood as the fever of 1821, and continued until frost. By the public it was attributed to a vessel that discharged a cargo of damaged coffee near the spot where the vessel from Guadaloupe lay, in 1821. The disease, in 1822 and 1826, was limited to business portions of the city, and to those sections where less care was taken to promptly remove filth. During September and October, 1852, several cases occurred in Portsmouth, of which four were fatal.

In Norfolk, the same summer, (1852,) the cases amounted to several hundred, and the deaths were upwards of fifty. On very strong presumptive evidence the disease was traced to the *Tascio*, a Spanish vessel, which arrived July 20th from Havana, Cuba. During the summer of 1854, a steamer, named *Chimère*, from the West Indies, came into the harbor. She had on board several cases of yellow fever, which were cared for at the United States Naval Hospital near Norfolk. This year some seventy cases were treated in the Hospital, *a* but no well person became sick through contagion. Some cotton and canned goods were thrown overboard from this vessel, and were picked up by people who lived on adjacent banks or near the river. Among those who handled the articles a number were attacked by the fever, and several cases proved fatal. From these cases no others arose.

The year 1855 (in which occurred the epidemic which is the more especial subject of this paper) was not remarkable for its meteorological conditions. Although sultry, south and southwest winds prevailed, and the temperature was

⁴ *Vide* Committee's Report on the Yellow Fever in Norfolk in 1855.

high,⁵ yet records show that of thirty previous years fifteen were hotter than 1855; and that in 1826 and 1852 only was fever present in Norfolk. For thirty years there had not been yellow fever of any great extent in the two cities, and less vigilance in regard to the enforcement of the quarantine regulations may have been observed than before. The condition of the two cities as to cleanliness was not different from what it had usually been.

June 7, 1855, the steamer *Ben Franklin*, from St. Thomas, W. I., with yellow fever on board, came into Hampton Roads. After twelve days quarantine she moved to a shipyard in Gosport, the captain having promised that in effecting repairs the hold should not be broken out. The promise was not kept. The vessel had fever on board before coming to Gosport, during her stay, and after returning to quarantine, where she was sent July 8th.

The first case in Portsmouth, June 24th, was a woman about sixty-five years old, unacclimated. The only means of infection reaching her seemed to be the wind, which, for two days, and contrary to its usual course, blew from where the *Ben Franklin* was in quarantine toward her home.⁶ The hygienic condition of her residence, one and a half miles from Gosport, were favorable for malarial fever, and for poisonous exhalations; yellow fever had been in the same house in 1854. The 30th of June a workman on the steamer was taken sick with the fever. Three other cases appeared the same date, about three hundred feet west from the berth of the vessel in the shipyard. July 8th the disease broke out in a filthy section of Gosport. July 10th the infected district in Gosport was fenced in, but the pestilence spread rapidly in all directions. By August 1st it had reached a point in the Navy Yard some five hundred yards southwest from the ship; and at the same time the fever made its appearance in the southern part of Portsmouth,

⁵ The average temperature for 1855, in June, at 3 p. m., was 82° F.; last ten days of June, 88½° F.; for July, 88° F.

⁶ The like occurred in New York harbor in 1856.

about as far north from the shipyard. The authorities of Portsmouth procured the use of the United States Naval Hospital, about half a mile from the city.

Up to the middle of July Norfolk continued remarkably healthy. The first case observed in this city occurred about July 1st in the practice of Dr. H. M. Nash, of Norfolk, Va., (who has courteously given this information.) The subject was a boiler-maker, a workman on the *Ben Frankiin*, probably the same one noted under date of June 30th. The first case which originated in the city of Norfolk was a woman, taken sick July 16th, in the same house in which her daughter had died of the fever in 1854. It was in a filthy part of town, Barry's Row; and from this centre the disease spread in all directions. The shipyard where the *Ben Franklin* had been was a little more than a mile from this place, in a direction southwest by south; and during her stay there the wind was southwest for sixteen days. Ordinary intercourse with Gosport had not been productive of disease in Norfolk. Barry's Row was fenced about, and the sick removed to temporary shelter beyond the city limits, but the fever spread, in wave-like advances, and in the course of the wind. It seemed to extend more easily along the water where there was nothing to obstruct its progress, than in the city and over the land. The position of the cases on board the United States Ship *Pennsylvania* also seems to show that the cause of the fever came by the wind, for persons who slept to windward in the vessel were attacked, while those on the leeward side escaped.

By August 13th three-fourths the population of Portsmouth and one-half that of Norfolk had fled. The exodus was doubtless increased from fear lest all communication with the outside world would be cut off. Quarantine against the stricken district had been established by the authorities of Old Point Comfort, Suffolk, Petersburg, Richmond, Washington, and Baltimore, while Matthews county and the Eastern Shore of Virginia and Maryland were yet accessible by steamer. Thus by double shipment people could reach their

friends and go beyond danger. No disease seems to have been propagated by these means, though several sick died after reaching a healthy place.⁷

By August 23d several experienced physicians had come from other cities to give their services. These, in opposition to the commonly received opinion, believed that the disease was not contagious. Proper care of the sick depends very greatly upon the idea people have on this subject; hence the importance of the truth being at once, and widely, known. About this time the fever hospital, which had at first been established just outside the city limits of Norfolk, was moved five miles further down the river, with decided improvement in the condition of the patients.

After September 1st, during dry, warm days, the fever seemed to spread slowly; but when the raw weather of the northeasterly storms came, whole sections of the city were attacked at once. It may be that this condition of the atmosphere was only needed to develop in the human system, and elsewhere, the latent cause of the disease. During the height of the disease, from the middle of August till the middle of September, market people came daily from the country into Norfolk, arriving early in the morning and returning before sundown. Dr. Rob't B. Tunstall reported that he knew of no case among these people. In some families every member was attacked, while other households escaped, though living, apparently, under similar conditions. In the course of the week ending September 1st the number of cases in Norfolk rose from about three hundred to nearly fifteen hundred. Burial in pits became necessary. One day interments numbered a hundred.

The *plague-flies*,⁸ so called, were seen on doors and win-

⁷ The same may be remembered of the epidemic in 1822, when fever patients went from New York City to Bloomfield, New Jersey; and one, at least, died there, but no new cases originated by contagion in consequence.

⁸ The plague-flies, according to description, were almost identical in shape with the smaller blow-flies or shad-flies, the posterior segment of the body being larger and longer in proportion to the entire insect than that of the common house-fly; the wings were opaque, of a glassy, bluish black color, and the body ochrey

dows while the disease was at its worst, the greatest prevalence of these insects being coincident with the height of the epidemic. Their presence under similar circumstances elsewhere does not appear to have been noticed.

After September 12th the number of cases was about half that it had previously been. October 2d, about five thousand whites remained in Norfolk, and of these nearly two thousand subsequently died of the disease. October 26th, came frost, and the ravages of the pestilence abated. November 10th, the epidemic was practically ended. In the United States Naval Hospital five hundred and eighty-seven cases had been received, of which two hundred and eight were fatal. All citizen patients had left the Hospital October 1st. In Portsmouth fifty per cent. of whites died; of blacks, less than five per cent.⁹ The total number of deaths in Portsmouth was about one thousand; in Norfolk about two thousand. Exact statistics are unattainable.

During this epidemic some physicians thought the first cases sporadic only, and of mild type. There was no essential difference in the character of the disease in the two cities. At first deaths were principally among those unacclimated. Some fatal cases were evidently due to imprudence of the patients—such as not taking proper care after the crisis had passed. It has been often noticed that about eleven days intervene from the arrival of an infected vessel to the outbreak of the fever on shore—as in this year 1855. In this epidemic the disease was as clearly proven non-contagious as negative evidence could do so. The poison was not conveyed by persons.

Typhoid fever is said to be dependent upon a specific growth, which finds its *habitat* in putrefying material and

yellow. They were short lived, many dying in twenty-four hours after first seen. They decomposed rapidly, leaving a little mass of dust. They may have been flies which ordinarily were few and unnoticed, but which increased greatly under the circumstances that gave rise to yellow fever, and which were affected by the disease much the same as man was. Possibly they were merely scavengers.

⁹ In the epidemic of yellow fever at Gibraltar, during 1828, the mortality in those attacked was 20 per cent. *Vide* observations of P. Ch. A. Louis.

the like. It may be the same with yellow fever: thus, filth or putrefaction alone seems not sufficient. Dr. Stone, of New Orleans, La., laid great stress on filth being a secondary cause of much importance in production of yellow fever. Meteorological conditions, such as heat, cold, moisture, dryness, electricity, were probably elements of much force in the spread of the disease. Heredity may account for the immunity of the negroes, their ancestors having been exposed, during many generations, to malarial and other poisonous influences of Africa. Freedom from disease seemed in proportion to purity of race—those part white suffering more than pure blacks.

As to the origin of this epidemic of 1855 two opinions were held. One was in favor of local origin; the other, that seeds of disease were brought in the steamer *Ben Franklin*.

The conditions usually deemed essential for the production of the disease—heat, moisture, decaying vegetable matter—were abundant in the district of the epidemic that summer. But the season did not seem so different from others as to cause apprehensions based on these facts alone.

The accepted solution of the question as to origin was that the germs of the disease were brought in the vessel referred to, but that local conditions were ready for its fearfully-rapid propagation, and became a partial cause of its great virulence.

In the epidemic under consideration the following symptoms were usually observed: For two or three days preceding an ordinary attack there were languor, weariness, chilliness, pain in head and back, and aching in joints and limbs. After the onset of the disease, which was sometimes by a chill, the skin became hot and dry, the face, neck, and breast assumed a deep red hue; the eyes became suffused, red, muddy, and very sensitive to light (this condition of the eyes was a very unfavorable symptom); the hearing was, at times, very acute, or there might be ringing in the ears; the tongue was puffed, flabby, milky, heavily coated with white

fur, the edges often showing marks of the teeth (being the so-called "oyster-tongue"), and tremulous in motion; the gums were offensive; thirst was urgent, the desire for cold drink being insatiable; the pulse was frequent, irregular, sometimes very slow; and respiration was laborious. The stomach was the organ generally most affected, there being in it a sense of great oppression and of intense burning. Desire to vomit was persistent, and the mildest fluids were seldom retained. First were thrown up the contents of the stomach; next, thin, yellowish bile; and later, dark, greenish bile,¹⁰ copiously. The bowels were confined, the evacuations few and deficient in biliary secretions. Frequently the brain sustained the burden of attack, shown by excitement and delirium, to be followed by convulsions, prostration, coma. One main characteristic of the fever, especially during the latter part of the summer, was a terrible nervous restlessness, which often caused the sick to throw off the bed-clothes, and thus to stop salutary perspiration.

After an interval of from twenty-four to seventy-two hours, if recovery were to follow, these sensations of disease gradually ceased, (the fever being of one paroxysm,) and a general feeling of ease and comfort was experienced.

Were, on the other hand, a fatal result impending, the system was left in extreme prostration. The patient was listless, in a stupor, or in delirium. The distress in the stomach increased, with painful retching; and the matter vomited was dark, flocculent. In some cases, on the second or third day, though not usually before the fourth or fifth, the
 a vomit became like thick, muddy coffee, and black as tar.¹¹

¹⁰ In the epidemic at Gibraltar of 1828 the greenish vomit is stated to have been alkaline. It is also reported that, in the same epidemic, vomitings occurred from five hours to five days after the onset of the disease.

¹¹ This, for which "black vomit" has become the specific name, was (and is) considered to be the result of the disintegration of the blood, and of the mixture of it, thus altered, with the liquids of the tissue or organ in which the change occurred, or into which this morbid fluid, or semi-fluid mass, made its way. It is stated that, during the epidemic at Gibraltar, in 1828, vomiting was sometimes suspended for a few hours after administration of opium. *Vide* observations of P. Ch. A. Louis, published by Massachusetts Med. Society, p. 48.

Sometimes pure blood came up in considerable quantities; and the discharges from the bowels were similar in character to the ejections from the stomach by the mouth. Mere pressure over the stomach would sometimes provoke emesis. The skin, which had been dry and hard, now became cold and clammy, particularly about the forehead, breast, and arms. Then might come the ominous hiccough. Hæmorrhages also might occur from all the mucous membranes, sometimes from the skin itself; and this at times could take place even while the patient was perfectly rational. Suppression of urine was a very fatal symptom.¹²

So insidious, occasionally, was the invasion of the disease that some individuals could scarcely be persuaded that they were sick, much less that they had the fever. The initiatory symptoms were frequently wanting. Dr. R. B. Tunstall stated that the prodromes existed more in the earlier part of the summer than later. At the height of the epidemic the disease seemed to strike at once, like a shot or as a thunderbolt. In his own experience, one case, attacked thus suddenly, had a pulse in the forenoon of 120, and in the afternoon of the same day it fell to 56, with fainting; but recovery soon followed. The pains in the back and limbs, in many cases, seemed to act as an escape (diverticula) for the *materies morbi*, and thus to protect more vital organs. In a few cases the black vomit came on within eight or ten hours after the attack, and sometimes without any previous mucous or bilious discharges. Some survived black vomit, but death usually succeeded it in twenty-four or thirty-six hours. Dr. Tunstall stated a case of recovery from yellow fever, after the recurrence of copious black vomit, in a girl of seventeen. This case came within his own observation in 1853. Dr. H. M. Nash also mentioned a case, in the epidemic of 1855, in a man less than twenty years of age, in whom there had not been the vomiting, but the material of black vomit

¹² It is stated by Louis that, in the epidemic of 1828, at Gibraltar, suppression of urine was a rare symptom, and that in some cases recovery followed.

had passed per rectum.¹³ The occurrence of black vomit is much more alarming in relapse, it being then less manageable. Infancy and childhood had no immunity in 1855.¹⁴ During the epidemic of 1821 there was a fatal case in which hemorrhage took place from the eyes.

The color of the skin, from which the disease derived its name, was not usually met with in early stages of the fever, but generally just preceding and succeeding dissolution. First it was a dingy yellow hue; gradually it became brighter, till after death, when the tinge was a deep lemon color. The eyes became yellow; and the salivary, renal, and cutaneous secretions were colored in like manner. At that time (1855) this coloration was considered to be due to the interference with the natural function of the liver, and the re-absorption of bile.¹⁵

Recovery was often rapid. Convalescence was speedy or tedious apparently in accordance with the predominance of pains in the back or of lesions of the stomach. Many persons seemed to have better health after recovery from an attack of yellow fever than before.¹⁶

According to the opinion of Dr. Tunstall, pregnant women seemed to be especially in danger. Several features which characterize typhoid fever were present during the epidemic. Glandular and other abscesses were sequelæ which sometimes caused death, and that suddenly. Dr. Nash noticed

¹³ Louis stated that, during the epidemic of 1828, at Gibraltar, the matter of "black vomit" was found in the stomach and other portions of gastro-intestinal tract, even in cases where none had been vomited.

¹⁴ During the epidemic of 1828, at Gibraltar, it is stated that children frequently recovered from yellow fever after having had "black vomit." *Vide* observations of P. Ch. A. Louis.

¹⁵ It is now (1883) believed to be caused by the coloring matters of the blood as they undergo the changes of decomposition.

¹⁶ It does not appear that any chemical or microscopic examinations of the secretions or excretions were made, in this epidemic. Recently Dr. Carmona del Valle has discovered in them, he thinks, a micro-organism characteristic of yellow fever. He calls it *permosphera lutea*.

that, during convalescence, multiple abscesses sometimes occurred.¹⁷

In regard to *treatment*, the main object, in the earlier stages of the disease, was the elimination of the poison from the system. This was attempted by causing lively action of the emunctories, particularly of the skin, bowels, and kidneys. Perspiration was promoted by hot and by partial mustard baths, warm teas, and wrapping in blankets. This process was tentative, mild, and continuous; for a copious sweating might be too weakening to the system, attacked at the same time by the poison of the disease. For the same reason enemata were employed, or mild cathartics rather than those of a drastic nature. Teas and demulcent diuretics were used in preference to powerful ones. Small pieces of ice were given to relieve the feeling of heat in the stomach, while mustard plasters and bathing were used on epigastrium to lessen local pain and combat nausea. Besides these was enjoined perfect rest in recumbent position, accompanied with quiet, and with symptomatic treatment.

Thus far there was no essential difference in the practice of physicians. But at this period of the disease, while some chose to wait and merely try to aid nature in building up the patient, others thought a different course necessary, if the fever remained rather high. The second class used calomel, castor oil, and vesication. If, after the bowels were freely purged, fever continued somewhat strong, calomel and quinine, in five-grain doses each, were given every four hours. Were the stomach unable to retain this, an enema, consisting of a drachm of quinine and a gill of starch water was used. In each case quinism was to be produced. Frequently a perseverance in such medication very early resulted in free perspiration and cessation of fever; but great prostration followed. Just how far this

¹⁷It is stated that the morbid condition of the liver was the only constant and uniform lesion of yellow fever as observed in Martinique (W. L.) previous to 1828. The same was noticed in regard to the epidemic of yellow fever at Gibraltar in 1828. *Vide*, Observations of P. Ch. A. Louis.

practice should be carried, before beginning restorative measures, was the nice point in treatment. The pain in stomach received symptomatic treatment. The strong astringents were useful in some cases of hæmorrhage. In 1821, charcoal taken internally was used with apparent good result, even after the appearance of black vomit. Dr. Tunstall stated that this medication failed decidedly in 1855, when better results were obtained from the use of creasote and blisters; and the good effects of these were more permanent. Dr. Nash, in 1855, used with satisfactory result creasote and turpentine with a few drops of castor oil. By such means the formation of black vomit, the irritability of stomach, and slight constipation, were combated. If sweating could be brought about during the vomiting stage the tendency to throw up the contents of the stomach became less. The last portion of the care of the patient consisted in general restorative measures. Premature effort on the part of those on fair way to recovery was a great danger to be carefully guarded against.

In short, the main points of treatment were:—(1) to procure repose of body and mind; (2) to cause evacuation of bowels by mild cathartics; (3) to induce free perspiration; (4) to protect the stomach and relieve its irritability; (5) after subsidence of fever to sustain and build up the system. During convalescence the patient should not be allowed to commit errors of diet, to leave the bed too soon, or to go out unseasonably. On the whole, the expectant treatment seemed to be followed by the best results.¹⁸

REMARKS BY DR. J. H. KIDDER, U. S. N.

Dr. Kidder remarked that the Society is to be congratulated upon this unusually careful and complete statement

¹⁸ As to the general principles of medication the paper under the following title may be read with advantage: "Disease—a Part of the Plan of Creation" (the Annual Address before the Massachusetts Medical Society, May 31, 1865) by B. E. Cotting, M. D.

of the natural history of a single epidemic of yellow fever, and of the medical constitution of the locality in which it occurred. He thought that the answer to the vexed question of the causation of yellow fever was to be sought in such careful studies of individual epidemics, rather than in the personal recollections and opinions of single practitioners of however great skill and experience. Points which had struck him as of especial interest were—1st, the fact that the fever had appeared in 1826 in the same neighborhood as in 1821; 2d, that, although the *Chimère*, in 1854, imported many cases of yellow fever, so many that some 70 cases were treated in the Naval Hospital alone, no well person was affected by the contagion, but those who handled the goods thrown overboard from the *Chimère* were attacked, with some fatal results, still there was no epidemic in this year; 3d, in 1855, when the *Ben. Franklin* came to be broken out, and the epidemic under discussion was set a-going, nothing remarkable was noticed in the meteorological conditions of the season. On this occasion, however, the first case occurred in an unacclimated person inhabiting a house to leeward of the ship, in which house yellow fever had occurred in the previous year; 4th, the disease had, in 1855, extended over a circle, the centre of which was the ship's berth, and the radius about 500 yards, in thirty-seven days from the date of the first case, and its advance had been noted as progressive during this time: (the rate of progression was almost exactly 40 feet per day here, as it has been observed to have been elsewhere, in New Orleans, for example;) 5th, the disease presently became epidemic, not only in Gosport and Portsmouth, but in Norfolk, two miles away, where the first case was a woman in the same house in which her daughter had died the year before.

Now, the conditions supposed to be favorable to an epidemic of yellow fever—viz., a temperature above 72° , moisture, decomposing organic matter, and the importation of the disease—were present at Portsmouth both in 1854 and in 1855, yet in one year there was no epidemic, and in the

next the very fatal epidemic now under consideration occurred. Similar instances are reported by Beranger Féraud in the history of Yellow Fever at Martinique; by Medical-Inspector Donnet, at Port Royal, Jamaica. (British Naval Medical Reports;) and frequently in the reports of United States naval surgeons. At one time yellow fever cases are imported with nearly absolute impunity to the rest of the population; at another the whole locality becomes speedily infected, and every illness ends in yellow fever sooner or later.

The speaker did not intend to repeat at length the evidence to this point, but wished only to call the Society's attention to the additional evidence afforded by this paper to the probable existence of a fifth condition, besides those already named—probably meteorological, a something in the air which made epidemics possible, and which was essential to their occurrence. Dr. Charles Findlay, of Havana, thought that he had found ammonia, or an *amine* reacting similarly, in the air, which was not present when yellow fever did not prevail. The speaker knew of no exact physical investigation of this part of the subject. It was also to be noticed that the first cases occurred always in houses infected by previous epidemics, indicating the probable survival of a *materies morbi*, or germ if you like, in the substance of the buildings; possibly, as has been suggested, in the rotten wood. Dr. Kidder was glad to hear again so explicit recognition of the fact that yellow fever is a disease of a single paroxysm; after which, so far as the disease itself is concerned, there is an end of it: and the so-called relapses and multiform complications grouped together as *sequela* are simply the results of the more or less disorganized condition in which the blood and important organs have been left by the paroxysm. He thought the fact of especial importance in its bearing upon therapeutics.

REMARKS BY DR. ALBERT L. GIHON, U. S. N.

It is pertinent to repeat in this connection the statement I made at the Sixth Annual Meeting of the American Public Health Association at Richmond, Va., 22d November, 1878,* when the epidemic of that year was under discussion. I then expressed what I believed to be the general opinion of the medical officers of the Navy,† whose opportunities for studying the natural history of yellow fever are unusual, in the following terms:

1. The yellow fever ship is always a foul ship.
2. Foul ships, while often generating by their fifth other epidemic diseases, have never developed yellow fever *de novo*.
3. When a foul ship *visits* a port where yellow fever is prevailing, communication with that port induces the development of yellow fever among its crew.
4. A clean ship may visit a yellow fever port, and by vigorously abstaining from communication with that place escape yellow fever contamination.
5. When yellow fever appears on board a ship the only safety for the well is to get them out of the ship.
6. The sick can usually be removed from the ship, provided the infected bedding and clothing are not also removed, with entire impunity to those among whom they are received.
7. Nurses and attendants upon the sick with yellow fever on board ship are not more liable than the other occupants of the vessel to contract the disease.
8. When yellow fever appears on board ship it is possible to imprison it until the vessel can reach a safety port, by battening down and calking the hatches and every other outlet for emanations from below, the crew being restricted to and sleeping in the open air of the spar deck, and abstaining from the use of food, drink, or clothing which have been exposed to infection below deck.
9. If this ship is removed to a locality where bad sanitary conditions prevail, and any of its contents are there discharged, it will inevitably disseminate yellow fever.
10. It is believed that localities to leeward of currents of air from a vessel infected with yellow fever will be infected thereby.
11. Freight, food, baggage, clothing, etc., must remain undisturbed on board until the lower decks have been exposed to a prolonged continuance of extreme cold weather.
12. No ship in which yellow fever has appeared can ever be safely inhabited until after a similar protracted exposure to freezing weather and to saturation with an atmosphere of chlorine gas or dry superheated steam.
13. It is believed thorough permeation of the ship by dry superheated steam will destroy the germ of yellow fever.
14. It is our belief that yellow fever is due to a specific organic germ, of which the vitality may be impaired, if not wholly destroyed, by extreme cold, and which germ usually propagates itself when deposited in a nidus by visible or invisible filth.

* Transactions of American Public Health Association, Vol. IV.

† Sanitary and Medical Reports by medical officers of the Navy, published by the Bureau of Medicine and Surgery, Navy Department, Vol. I-VII.

I have since been assured by a large number of officers who have had experience with yellow fever that these propositions substantially represent their convictions as to the non-indigenous character of the disease in this country and the possibility of excluding it by a properly conducted sea-board quarantine.* While commerce must necessarily be hampered, in consequence, the wider interests of the community will be protected. In the words of Professor Chopin, of New Orleans, had yellow fever been excluded from that city in 1878 a million and a half dollars of trade might have been lost, but the city would have been spared the eleven millions and a half of loss that needlessly imported epidemic occasioned. The history of the yellow fever epidemic of Norfolk would not have had to be written had the *Ben Franklin* not been permitted to sow the seeds which produced such baneful fruit. There was yellow fever at Pensacola Navy Yard in 1874 because the stevedores who worked on board the vessels at quarantine, (two of these, the *Virtuoso* and *Castropol*, fever ships from Havana,) as well as deserters from their crews, secretly visited the villages of Woolsey (where the first cases appeared) and Warrington, on either side of the navy-yard, principally at night, often on a spree, but chiefly to sell or trade clothes and other articles which they had purchased or stolen on board the infected ships.

The prompt recognition of the first cases of yellow fever on board the *Vermont*, at the New York navy yard, in July, 1878, and the effective measures immediately taken by the medical officers to stamp it out, prevented a visitation that might have had consequences as fearful as in those other cities where the pestilence was allowed to brood. Here the cause was distinctly enough traceable to the landing of a lot of porous germ-laden ballast, from the barque *Juanita*

*“Yellow fever does not originate here (Key West) and an efficient quarantine may prevent its introduction.”—Dr. F. M. Gunnell, U. S. N. “I am a firm believer in its importation and feel confident that the epidemic under consideration (Pensacola) was caused by the disease being brought in infected ships and communicated through slack quarantine regulations to the neighboring cities, towns, and navy-yard.”—Dr. J. R. Tryon, U. S. N.

Clara, from Havana, on the cob-dock near the ship, where it was exposed to the mephitic emanations of Wallabout Bay, in which she was moored. The waters of this bay, saturated with the sewage of Brooklyn, were at this time agitated by the dredging of the channel close to the ship, and it is reasonable to suppose that the germs deposited on the cob-dock found their appropriate stimulus to activity in the organic effluvia from the ooze, as it lay in the scows exposed to the July sun. All the six cases, of which three were fatal, including our colleague, Dr. Holmes Wikoff, U. S. N., slept over the fetid pool close to the infected dock.*

Until a restrictive quarantine against all vessels coming from infected ports during the fever months is established at the mouth of Chesapeake Bay, none of the cities in its communicating waters, Norfolk, Richmond, Washington, and especially Baltimore, will ever be safe.

* Yellow Fever at the New York Navy-yard, by Dr. Joseph G. Ayres, U. S. N

